CLAIM AMENDMENTS

This listing of claims reflects all claim amendments and replaces all prior versions, and listings, of claims in the application (material to be inserted in amended claims is in underline, and material to be deleted is in ~~strikeout~~).

1. (Currently amended) A fuel cell system, comprising:

at least one fuel processor adapted to receive a feed stream and to produce a product hydrogen stream containing at least substantially pure hydrogen gas therefrom;

a hydrogen storage system adapted to receive and selectively store at least a portion of the product hydrogen stream, wherein the hydrogen storage system includes a mechanical compressor and an electrochemical compressor, wherein the electrochemical compressor is adapted to receive at least a portion of the product hydrogen stream and to divide the stream into a first portion that is delivered to a mechanical compressor and a second portion that is not delivered to the mechanical compressor, and further wherein the mechanical compressor is adapted to receive at least a portion of the product hydrogen stream and to produce a compressed gas stream therefrom, and at least one hydrogen storage device adapted to receive and selectively store the compressed gas stream; and

at least one fuel cell stack containing a plurality of fuel cells and selectively adapted to simultaneously receive hydrogen gas previously compressed by the mechanical compressor and hydrogen gas not previously compressed by the mechanical compressor and to produce an electric current therefrom.

2. (Original) The fuel cell system of claim 1, wherein the compressed gas stream and the product hydrogen stream have at least substantially the same composition.

3. (Original) The fuel cell system of claim 2, wherein the compressed gas stream and the product hydrogen stream have the same composition.

4. (Cancelled)

5. (Original) The fuel cell system of claim 1, wherein the hydrogen storage system includes at least one hydrogen storage device in the form of a compressed gas tank.

6. (Original) The fuel cell system of claim 5, wherein the fuel processor, the fuel cell stack and the hydrogen storage system are integrated together in a common housing.

7. (Original) The fuel cell system of claim 1, wherein the fuel cell system further includes at least one energy-consuming device adapted to draw at least a portion of the electric current from the at least one fuel cell stack.

8. (Previously presented) The fuel cell system of claim 7, wherein the fuel processor, the fuel cell stack and the at least one energy-consuming device are integrated together at least partially within a common housing.

9. (Original) The fuel cell system of claim 1, wherein the hydrogen storage system includes at least one pressure-regulating device adapted to selectively deliver at least a portion of the product hydrogen stream to a hydrogen storage device in the hydrogen storage system upon actuation of the mechanical compressor.

10. (Original) The fuel cell system of claim 1, wherein the fuel processor includes a hydrogen-producing region in which a stream containing hydrogen gas is produced from the feed stream.

11. (Original) The fuel cell system of claim 10, wherein the stream containing hydrogen gas includes hydrogen gas and other gases, wherein the fuel processor includes a separation region in which the stream containing hydrogen gas is separated into a hydrogen-rich stream containing at least substantially pure hydrogen gas and at least one byproduct stream containing at least a substantial portion of the other gases, and further wherein the product hydrogen stream is formed from the hydrogen-rich stream.

12. (Original) The fuel cell system of claim 11, wherein the separation region includes at least one hydrogen-permeable membrane.

13. (Original) The fuel cell system of claim 12, wherein the separation region includes at least one hydrogen-selective metal membrane.

14. (Original) The fuel cell system of claim 13, wherein the at least one hydrogen-selective metal membrane includes at least one of palladium and a palladium alloy.

15. (Previously presented) The fuel cell system of claim 11, wherein the separation region is adapted to separate the stream containing hydrogen gas into the hydrogen-rich stream and the at least one byproduct stream through a pressure swing adsorption process.

16. (Original) The fuel cell system of claim 11, wherein the fuel processor further includes a purification region into which the hydrogen-rich stream is further purified to produce the product hydrogen stream.

17. (Previously presented) The fuel cell system of claim 1, wherein the feed stream contains a carbon-containing feedstock and water, and further wherein the fuel cell system includes at least one fuel processor in the form of a steam reformer containing at least one reforming catalyst bed in which the feed stream is converted to a mixed gas stream containing hydrogen gas and other gases.

18. (Original) The fuel cell system of claim 1, wherein the feed stream includes a carbon-containing feedstock, and further wherein the fuel cell system contains at least one fuel processor adapted to receive the feed stream and to produce therefrom a stream containing hydrogen gas from which the product hydrogen stream is produced via pyrolysis.

19. (Original) The fuel cell system of claim 1, wherein the feed stream includes a water and a carbon-containing feedstock, and further wherein the fuel cell system contains at least one fuel processor adapted to receive the feed stream and to produce therefrom a stream containing hydrogen gas from which the product hydrogen stream is produced via a catalytic partial oxidation of the carbon-containing feedstock.

20. (Original) The fuel cell system of claim 1, wherein the feed stream includes water, and further wherein the fuel cell system contains at least one fuel processor adapted to receive the feed stream and to produce therefrom a stream containing hydrogen gas from which the product hydrogen stream is produced via electrolysis.

21. (Previously Presented) The fuel cell system of claim 1, wherein the fuel cell system further includes a controller adapted to selectively control the distribution of hydrogen gas in the fuel cell system.

22. (Cancelled)

23. (Previously presented) The fuel cell system of claim 21, wherein the controller is adapted to regulate the delivery of the product hydrogen stream to the hydrogen storage system and the flow of hydrogen gas from the hydrogen storage system.

24. (Previously Presented) The fuel cell system of claim 21, wherein the controller is adapted to monitor one or more operating parameters of the fuel cell system and to selectively regulate the delivery of the product hydrogen stream to the hydrogen storage system and to the fuel cell stack at least partially in response thereto.

25. (Original) The fuel cell system of claim 24, wherein the one or more operating parameters include a load applied to the fuel cell stack.

26. (Previously presented) The fuel cell system of claim 24, wherein the one or more operating parameters include the pressure of the hydrogen gas delivered to the fuel cell stack.

27. (Original) The fuel cell system of claim 24, wherein the one or more operating parameters include the flow rate of the product hydrogen stream from the fuel processor.

28. (Original) The fuel cell system of claim 24, wherein the one or more operating parameters include the pressure of the product hydrogen stream.

29. (Original) The fuel cell system of claim 24, wherein the fuel processor is adapted to have a plurality of operating states, and further wherein the one or more operating parameters include the operating state of the fuel processor.

30. (Cancelled)

31. (Original) The fuel cell system of claim 24, wherein the one or more operating parameters include the quantity of hydrogen gas stored by the hydrogen storage system.

32. (Original) The fuel cell system of claim 24, wherein the controller is further adapted to regulate the operation of at least one of the fuel processor and the fuel cell stack at least partially in response to the monitored operating parameters.

33. (Original) The fuel cell system of claim 24, wherein the controller includes a sensor assembly containing at least one sensor adapted to measure one or more operating parameters of the fuel cell system.

34. (Original) The fuel cell system of claim 33, wherein the sensor assembly includes at least one sensor adapted to communicate with the controller through a communication linkage.

35. (Original) The fuel cell system of claim 34, wherein the communication linkage includes a wired communication linkage.

36. (Original) The fuel cell system of claim 34, wherein the communication linkage includes a wireless communication linkage.

37. (Previously Presented) The fuel cell system of claim 21, wherein the controller is a computerized controller.

38. (Original) The fuel cell system of claim 24, wherein the controller is a computerized controller.

39. (Previously Presented) The fuel cell system of claim 38, wherein the controller includes a memory device containing at least one stored threshold value and further wherein the controller is adapted to compare at least one of the monitored operating parameters to the at least one stored threshold value and to selectively regulate the delivery of the product hydrogen stream to the hydrogen storage system and to the fuel cell stack at least partially in response thereto.

40. (Previously Presented) The fuel cell system of claim 37, wherein the controller includes a user interface with a display, and the controller is adapted to display information on the display.

41. (Original) The fuel cell system of claim 40, wherein the information includes measured operating parameters.

42. (Original) The fuel cell system of claim 40, wherein the information includes previously measured operating parameters.

43. (Original) The fuel cell system of claim 40, wherein the information includes one or more threshold values that are stored in a memory device of the controller.

44. (Previously Presented) The fuel cell system of claim 37, wherein the controller includes a user interface with at least one user input device adapted to receive user inputs, and further wherein the controller is adapted to selectively regulate the flow of at least one stream containing hydrogen gas to or from the hydrogen storage system at least partially in response to the user inputs.

45. (Cancelled)

46. (Cancelled)

47. (Cancelled)

48. (Previously Presented) The fuel cell system of claim 21, wherein the at least one hydrogen storage device includes a compressed gas tank.

49. (Previously Presented) The fuel cell system of claim 21, wherein the at least one hydrogen storage device includes a hydride bed.

50. (Original) The fuel cell system of claim 49, wherein the hydrogen storage system further includes a heating assembly adapted to selectively heat the hydride bed.

51. (Original) The fuel cell system of claim 50, wherein the controller is further adapted to control the heating assembly.

52. (Previously Presented) The fuel cell system of claim 21, wherein the at least one hydrogen storage device includes an activated carbon bed.

53. (Original) The fuel cell system of claim 52, wherein the activated carbon bed includes carbon nanotubes.

54. (Previously Presented) The fuel cell system of claim 1, wherein the fuel cell stack is adapted to simultaneously receive a hydrogen gas stream from the fuel processor and a separate hydrogen gas stream from the hydrogen storage system.

55. (Previously presented) The fuel cell system of claim 54, wherein the fuel cell system further includes at least one energy-consuming device adapted to draw at least a portion of the electric current from the at least one fuel cell stack.

56. (Previously Presented) The fuel cell system of claim 1, wherein the system further comprises a controller adapted to selectively regulate the delivery of the product hydrogen stream to the hydrogen storage system and to the fuel cell stack by regulating the pressure of the product hydrogen stream.

57. (Previously Presented) The fuel cell system of claim 24, wherein the controller is adapted to monitor an electrical load applied by an energy consuming device and regulate the pressure of the hydrogen gas responsive thereto.

58. (Previously Presented) The fuel cell system of claim 11, wherein the hydrogen storage system further includes an electrochemical compressor adapted to receive at least a portion of the product hydrogen stream and to divide the stream into a first portion that is delivered to the mechanical compressor and a second portion that is not delivered to the mechanical compressor.

59. (New) A fuel cell system, comprising:

at least one fuel processor adapted to receive a feed stream and to produce a product hydrogen stream containing at least substantially pure hydrogen gas therefrom, the fuel processor comprising:

a hydrogen-producing region in which a stream containing hydrogen gas is produced from the feed stream, wherein the stream containing hydrogen gas includes hydrogen gas and other gases; and

a separation region in which the stream containing hydrogen gas is separated into a hydrogen-rich stream containing at least substantially pure hydrogen gas and at least one byproduct stream containing at least a substantial portion of the other gases, wherein the product hydrogen stream is formed from the hydrogen-rich stream, and further wherein the separation region includes at least one hydrogen-permeable membrane; and

a hydrogen storage system adapted to receive and selectively store at least a portion of the product hydrogen stream, wherein the hydrogen storage system includes a mechanical compressor adapted to receive at least a portion of the product hydrogen

stream and to produce a compressed gas stream therefrom, and at least one hydrogen storage device adapted to receive and selectively store the compressed gas stream; and

at least one fuel cell stack containing a plurality of fuel cells and selectively adapted to simultaneously receive hydrogen gas previously compressed by the mechanical compressor and hydrogen gas not previously compressed by the mechanical compressor and to produce an electric current therefrom.

60. (New) The fuel cell system of claim 59, wherein the separation region includes at least one hydrogen-selective metal membrane.

61. (New) The fuel cell system of claim 60, wherein the at least one hydrogen-selective metal membrane includes at least one of palladium and a palladium alloy.

62. (New) A fuel cell system, comprising:

at least one fuel processor adapted to receive a feed stream and to produce a product hydrogen stream containing at least substantially pure hydrogen gas therefrom, comprising:

a hydrogen-producing region in which a stream containing hydrogen gas is produced from the feed stream, wherein the stream containing hydrogen gas includes hydrogen gas and other gases; and

a separation region in which the stream containing hydrogen gas is separated into a hydrogen-rich stream containing at least substantially pure hydrogen gas

and at least one byproduct stream containing at least a substantial portion of the other gases, wherein the product hydrogen stream is formed from the hydrogen-rich stream, and further wherein the separation region is adapted to separate the stream containing hydrogen gas into the hydrogen-rich stream and the at least one byproduct stream through a pressure swing adsorption process; and

a hydrogen storage system adapted to receive and selectively store at least a portion of the product hydrogen stream, wherein the hydrogen storage system includes a mechanical compressor adapted to receive at least a portion of the product hydrogen stream and to produce a compressed gas stream therefrom, and at least one hydrogen storage device adapted to receive and selectively store the compressed gas stream; and

at least one fuel cell stack containing a plurality of fuel cells and selectively adapted to simultaneously receive hydrogen gas previously compressed by the mechanical compressor and hydrogen gas not previously compressed by the mechanical compressor and to produce an electric current therefrom.